CPUC Utility Pole Safety En Banc

Los Angeles, CA

National Electrical Safety Code

Nelson G. Bingel III

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NESC

Chairman Strength & Loading

Executive Subcommittee

Main Committee

ASC O5 Committee - New Pole Specs

Chairman

Osmose Utilities Services, Inc

Vice President – Engineering

April 28, 2016

NESC

100 Years Old

Inaugural NESC Summit

100 Year NESC Anniversary

Keynote Speakers & Bios

Ms. Patricia Hoffman

Assistant Secretary
U.S. Department of Energy
Office of Electricity Delivery and Energy Reliability

Patricia Hoffman is the Assistant Secretary for the Office of Electricity Delivery and Energy Reliability at the U.S. Department of Energy. The Office of Electricity Delivery and Energy Reliability leads the Department of Energy's (DOE) efforts to modernize the electric grid through the development and implementation of national policy pertaining to electric grid reliability and the management of research, development, and demonstration activities for "next generation" electric grid infrastructure technologies.

Mr. James Maddux

Director of the OSHA Directorate of Construction, Department of Labor, Occupational Safety and Health Administration (OSHA)

Jim Maddux is Director of the OSHA Directorate of Construction. Before being appointed to the construction position in 2011, Jim held several leadership positions at OSHA, including Director of the Office of Physical Hazards, the Office of Maritime, the Office of Biological Hazards, the Office of Safety Systems, and Acting Deputy Director for the Directorate of Standards and Guidance.

Jim has been a project director, author and contributor to numerous OSHA

High Powered Speakers

Bob W. Bradish **AEP**
Vice President – Transmission Grid Development

Daniel K. Glover **Southern Company**
Vice President – Power Delivery - Distributioin

Robert Woods **Southern California Edison**
Managing Director of Asset Management and Operations Support

Stephen A. Cauffman **NIST-National Institute of Standards & Tech**
Manager, Community Resilience Program

Jorge A. Camacho,PE **PSC – District of Columbia**
Chief, Infrastructure and System Planning

2015 NESC Summit

NESC Organization

Executive Subcommittee
- Chairman
- Secretary
- 6 - 10 Members

Main Committee
- Chairman
- Vice Chair
- Secretary (IEEE)
- 25 - 35 Members

Technical Subcommittees
- Chairman
- Secretary

SC 1- Definitions, Sections 1,2,3

SC 2- Grounding

SC 3- Substations

SC 4- Overhead Lines – Clearances

SC 5- Overhead Lines – Strength & Loading

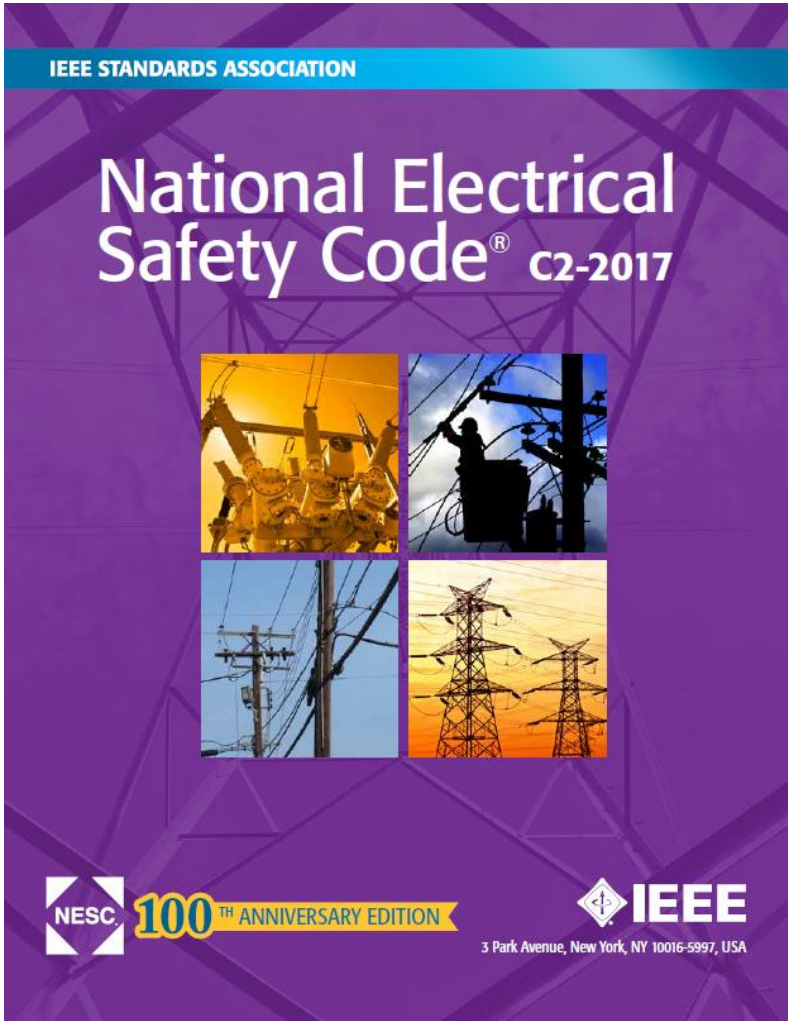
SC 7- Underground Lines

SC 8- Work Rules

Schedule for 2017 NESC

Submit change proposals:	Jan **19 Months** 13
First Subcommittees Votes:	Sept-Oct 2013
Preprint Distributed:	**13 Months** 14
Public Comments Until:	**9 Months**
Subcommittees Vote on Comments:	**6 Months**
Draft Submitted for Letter Ballot:	**3 Months**
Revisions Submitted to ANSI:	**4 Months**
Published:	**3 Months**
Effective:	January 2017

2017 NESC


IEEE STANDARDS ASSOCIATION
National Electrical Safety Code® C2-2017
NESC
100 TH ANNIVERSARY EDITION
IEEE
3 Park Avenue, New York, NY 10016-5997, USA

Insulators – New Rating System

Old Line Post ratings:

- **Rating equal to average**
- **Lowest not less than 85% of average**

New Line Post ratings:

- **Rating = Minimum of all insulators**

Insulators – New Rating System

Old Transmission Suspension ratings:

1.2 standard deviations

New Transmission Suspension ratings:

3.0 standard deviations

Insulators

CP Intention:

Adjust allowable stresses

Mostly equivalent insulator applications

Introduce Classes: Distribution & Trans

Different allowables for Rule 250B vs 250C, D

Aeolian Vibration – Rule 261H.1.b

261. Grades B and C construction

H. Open supply conductors and overhead shield wires

b. The potential for Aeolian vibration damage to conductors and related hardware shall be considered. Aeolian vibration mitigation shall be based on a qualified engineering study, manufacturer's recommendations, or experience from comparable installations. Consideration shall include but is not limited to: conductor material, stranding, type, size, tension, conductor attachment hardware, span length, wind exposure, and expected atmospheric loadings.

If from these considerations, mitigation actions are considered necessary, recognized vibration mitigation methods include, but are not limited to, the appropriate use of one or more of the following:

— vibration control devices

— stress-reduction devices

— self-damping conductors and (or) vibration resistant conductors

— reducing design tension limits for cold weather condition

Aeolian Vibration – Rule 261H.1.b

261. Grades B and C construction

Final Action: Accept

H. Open supply conductors and overhead shield wires

c. If limiting tension in Rule 261H1b(4) is the only method applied to mitigate any potential Aeolian vibration damage, the tension at the applicable temperature listed in Table 251-1 shall not exceed the following percentages of the conductor's rated breaking strength:

35% at initial tension without external loading

25% at final tension without external loading

NOTE 1: Initial tension in this application is a conductor condition that exists immediately after installation. This condition exists before inelastic elongation, creep or stress relaxation occurs and before the conductor is subjected to external loads.

NOTE 2: Final tension in this application is intended to be the tension that exists after long term creep and prior to ice or wind loading.

NOTE 3: The above percentage limits may not protect the conductor or facilities from damage due to Aeolian vibration.

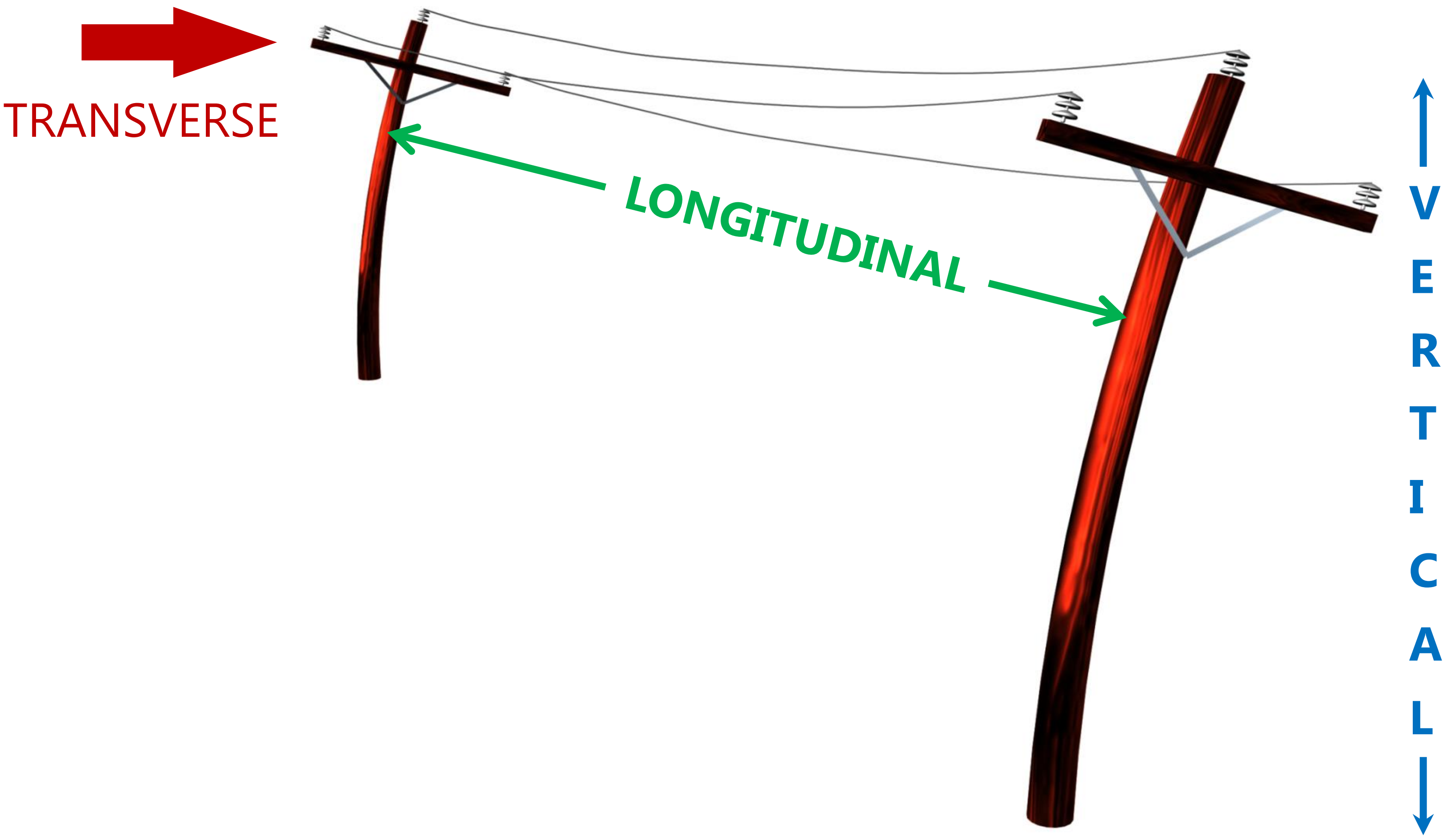
NESC

NESC Workshop
October 18-19, 2016

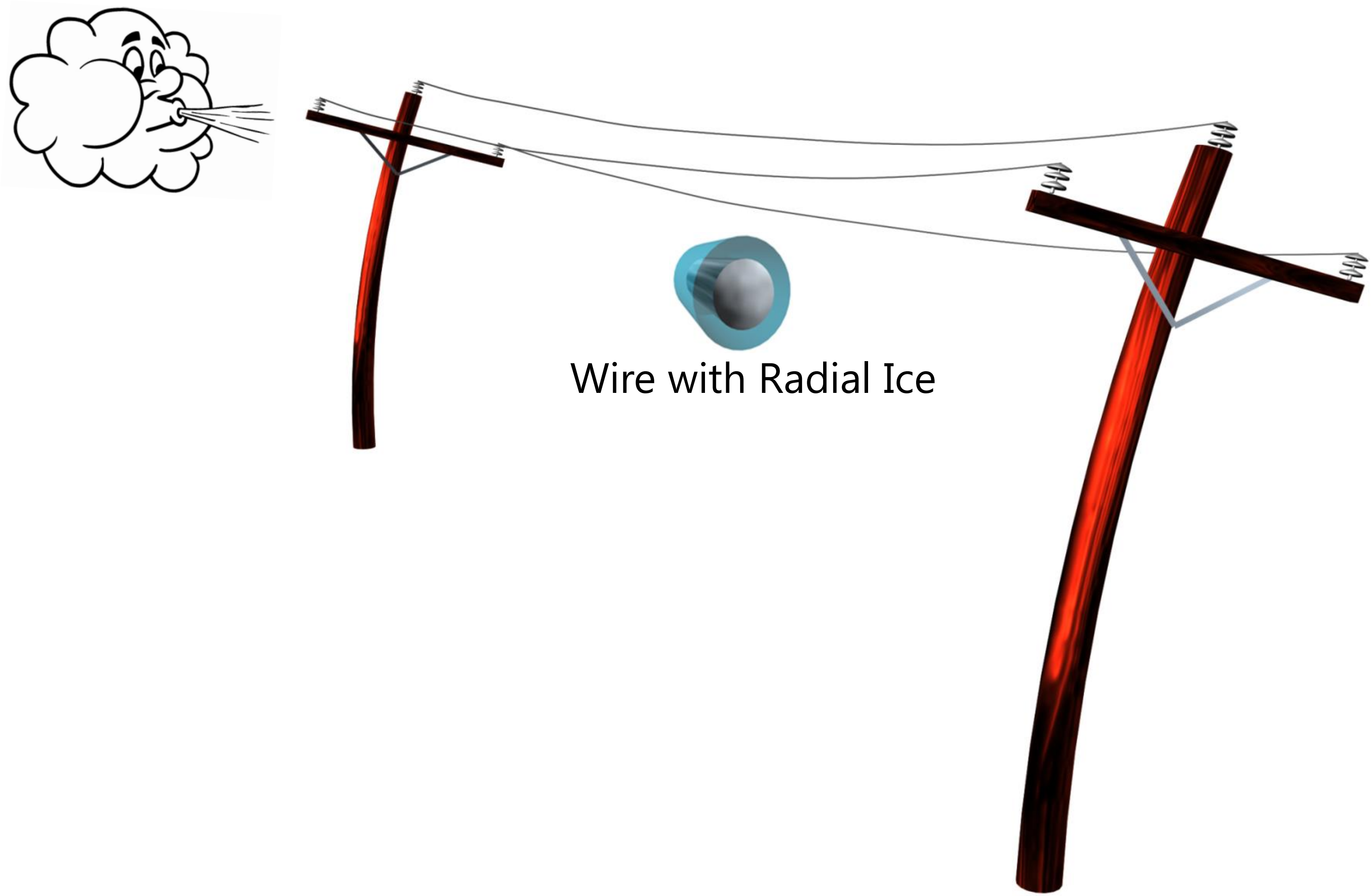
San Antonio, TX

- 2017 NESC Changes
- The Future of the NESC

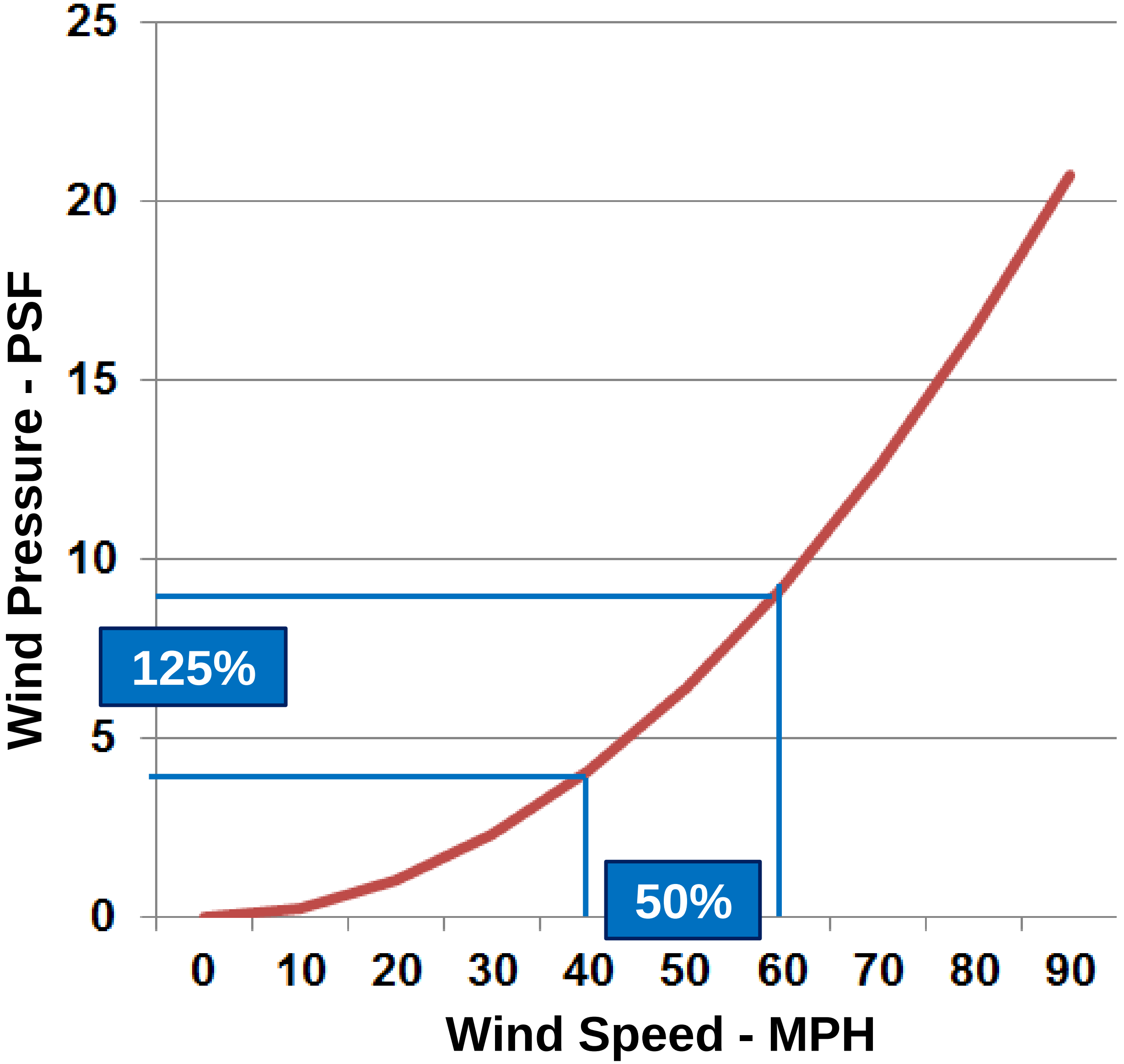
Loading Directions



Transverse Load



Wind Pressure vs Wind Speed



Maximum Stress Point

Solid, Round, Tapered, Cantilever

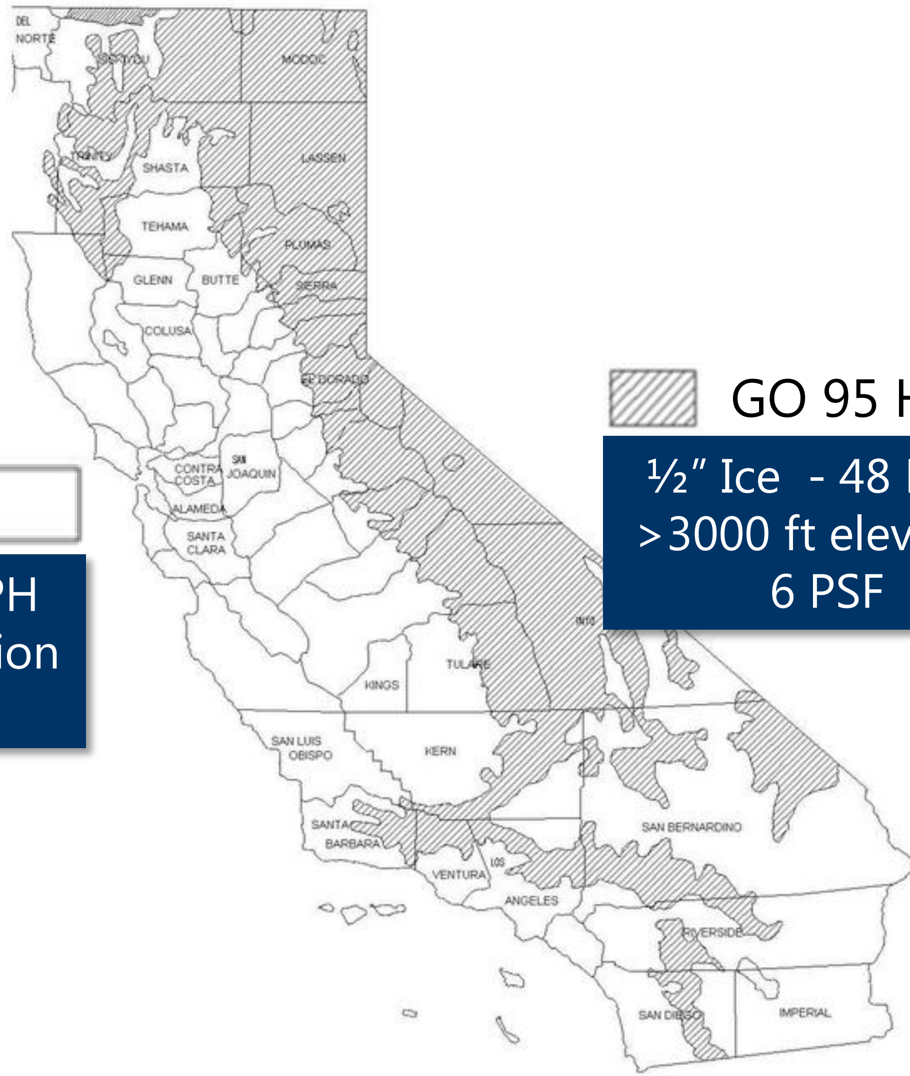
Load

(Wind Force on Wires, Equip., etc.)

Max Stress @ 1.5 Diameter Load Point

Distribution Usually Groundline

GO95 District Loading



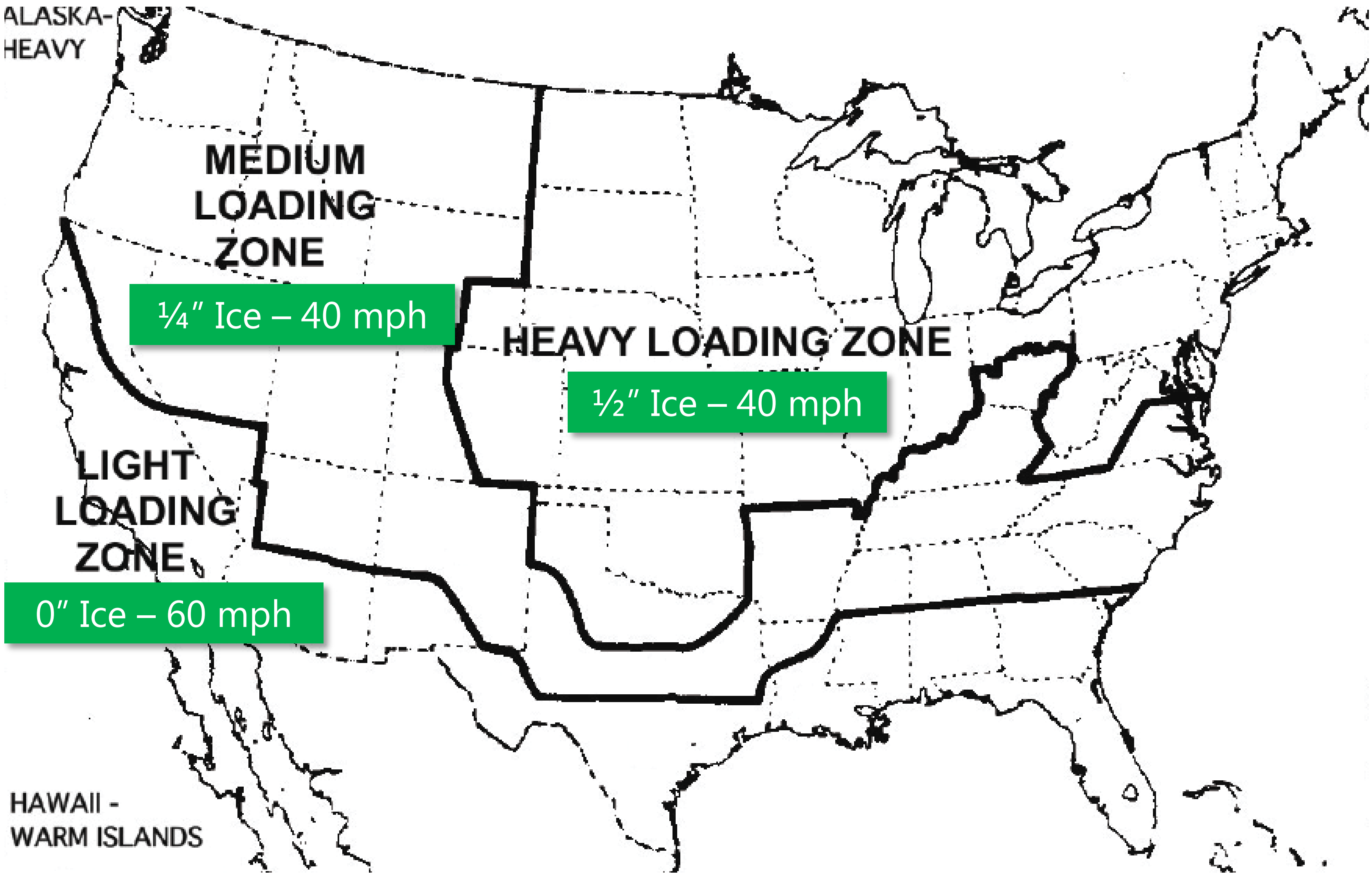
GO 95 Heavy

½″ Ice - 48 MPH
>3000 ft elevation
6 PSF

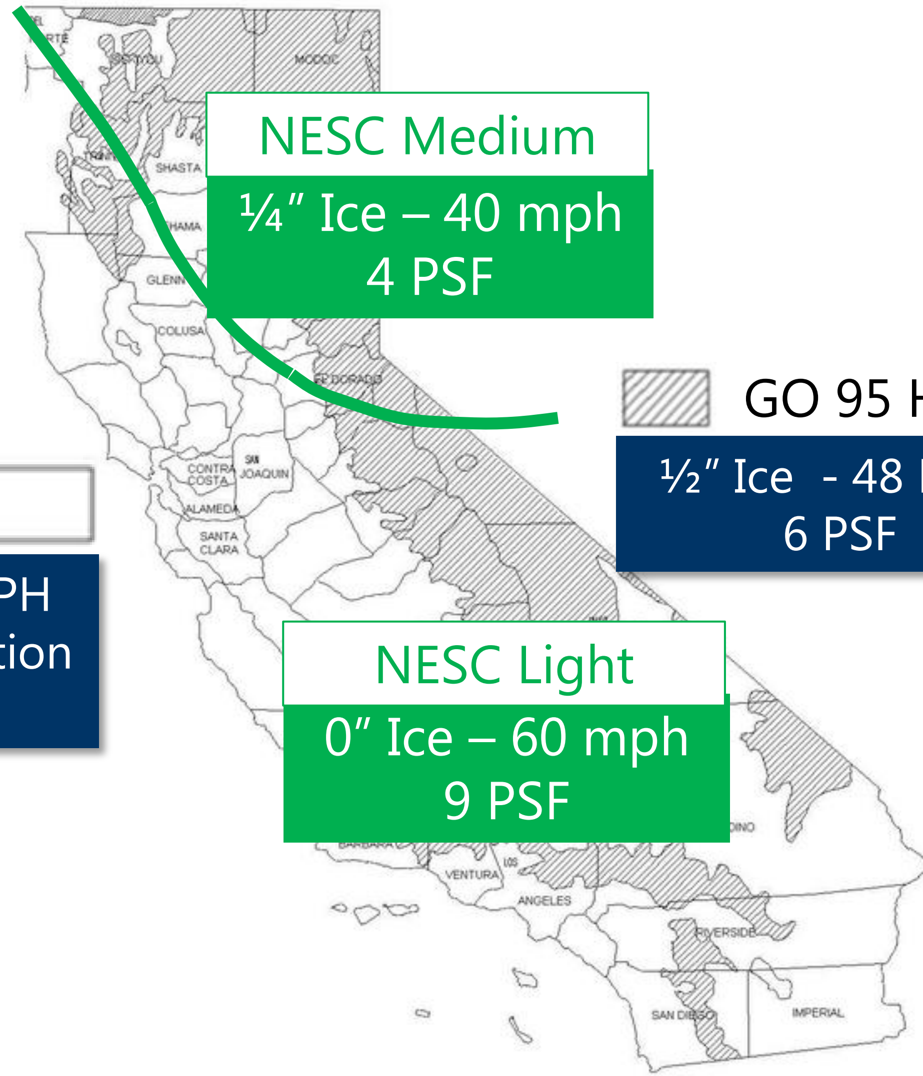
GO 95 Light

0″ Ice - 56 MPH
<3000 ft elevation
8 PSF

NESC District Loading



GO95 District Loading



NESC Medium

¼″ Ice – 40 mph
4 PSF

GO 95 Heavy

½″ Ice - 48 MPH
6 PSF

GO 95 Light

0″ Ice - 56 MPH
<3000 ft elevation
8 PSF

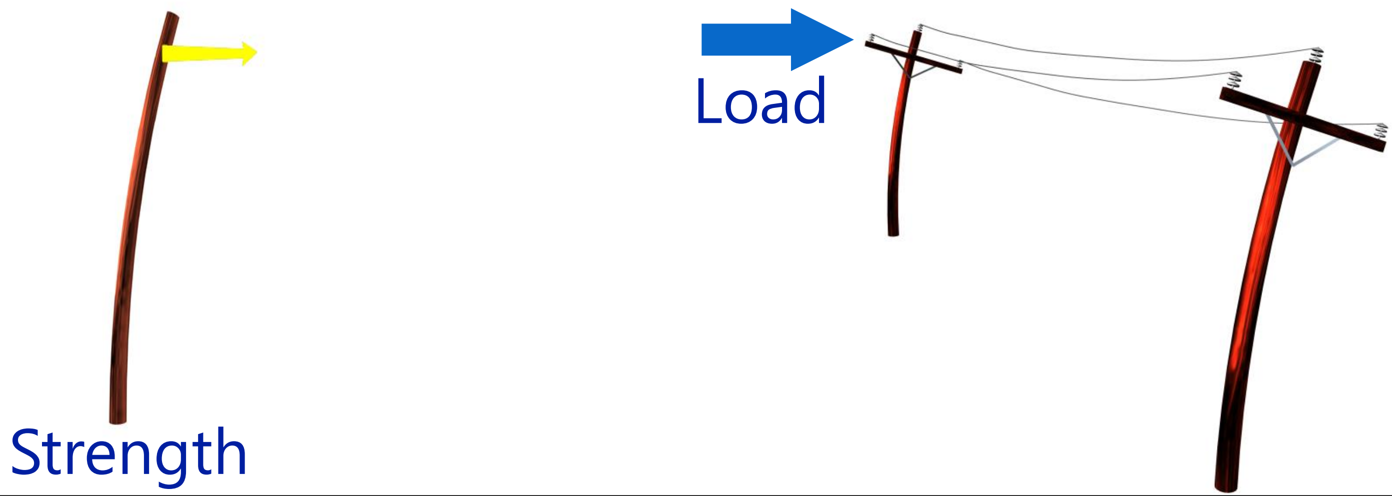
NESC Light

0″ Ice – 60 mph
9 PSF

Wood NESC Safety Factors

	1977 NESC		1977 NESC
Grade B	Safety Factor = 4	→	**.65** Strength Factor **2.50** Load Factor
Grade C	Safety Factor = 2	→	**.85** Strength Factor **1.75** Load Factor

Wood NESC Safety Factors



Load Resistance Factor Design

Load * Factor < Resistance * Factor
(Strength)

<u>1997 NESC</u>

Pole Strength x .65 > Storm Load x 2.5 (B)

Pole Strength x .85 > Storm Load x 1.75 (C)

Safety Factor Comparison

NESC		GO 95	
Grade	Wood SF	Wood SF	Grade
B	3.85	4	A
		3	B
C	2.06	2	C

NESC		GO 95	
Grade	Wood SF	Wood SF	Grade
B	2.5	1.5	A
		1.25	B
C	1.75	1.25	C

Safety Factor Reductions

	GO 95	NESC
Load	+33%	---
Strength	-33%	-33%

Increasing Load Requires:

1. Knowing Remaining Strength

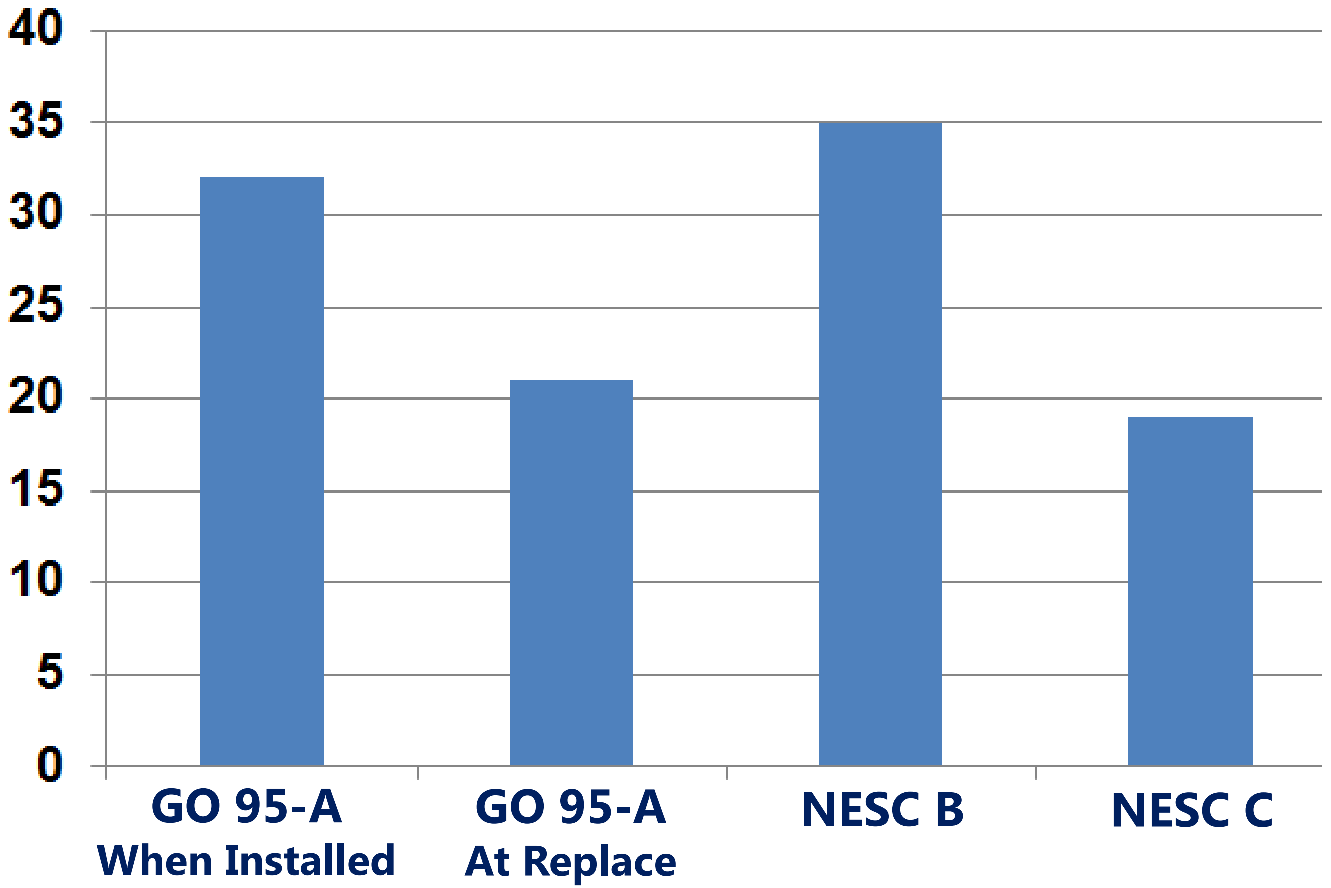
or

2. Applying 4.0

Load Safety Factor Comparisons

Code	District	Grade	Wind Pressure	Safety Factor	Factored Pressure
GO 95	Light	A	8	4	32
GO 95	Light	A	8	2.67	21
NESC	Light	B	9	3.85	35
NESC	Light	C	9	2.06	19

Load Safety Factor Comparisons



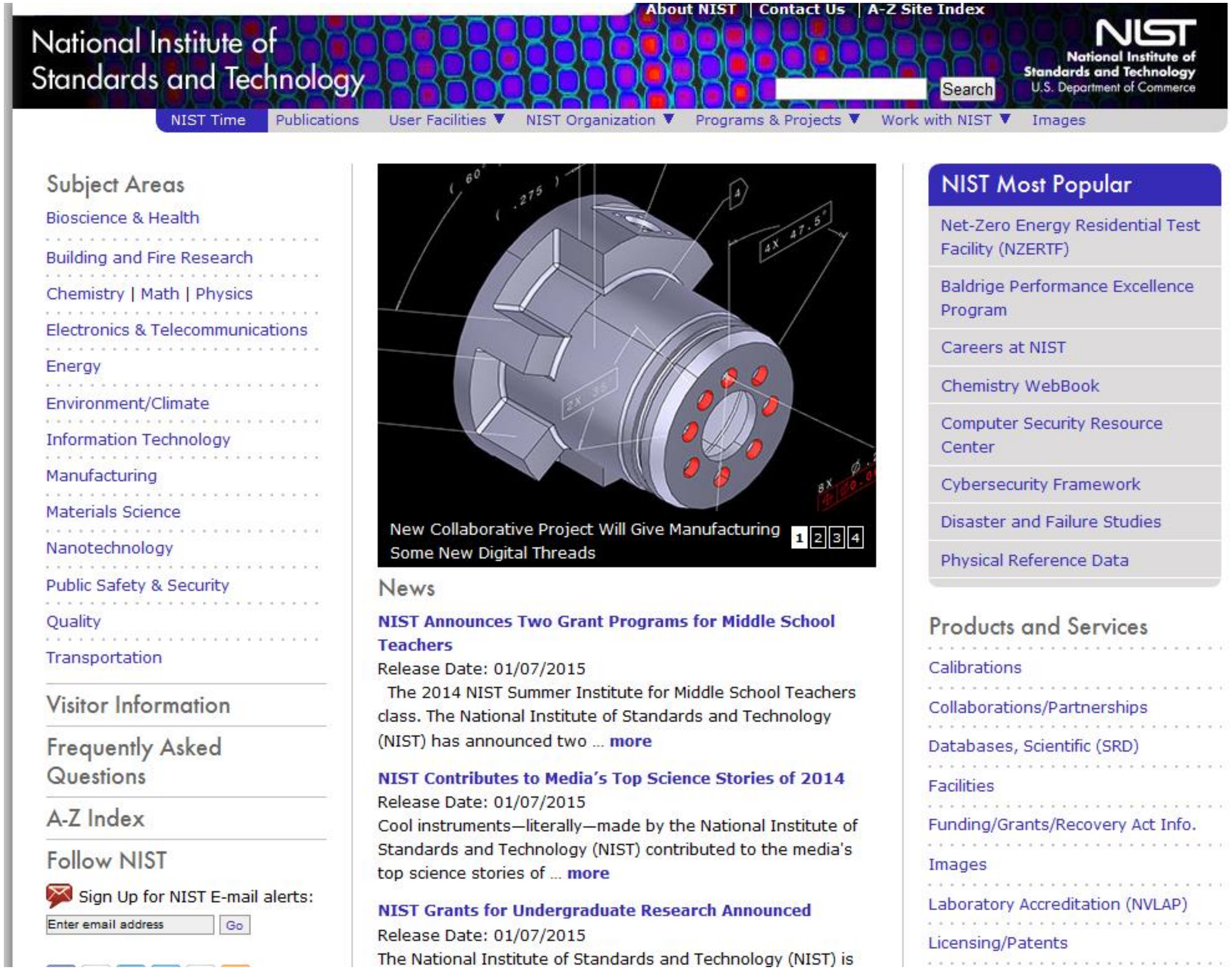
The NESC Going Forward

Safety

Reliability

Resilience

NIST-National Institute of Standards & Technology



NIST – Disaster Resilience Framework

Disaster Resilience Framework Document

The Disaster Resilience Framework will identify typical performance goals; existing standards, codes, and practices to enhance resilience; and gaps that must be addressed to enhance community resilience. The first version of the Framework will provide the basis for convening a Disaster Resilience Standards Panel (DRSP) representing the broad spectrum of the stakeholder community to further develop and refine the Framework.

Credit: NIST

The Future

National Institute of Standards & Technology

Department of Energy

California Public Utility Commission

Edison Electric Institute

American Society of Civil Engineers

Non-linear Analysis

Solar

Wind

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